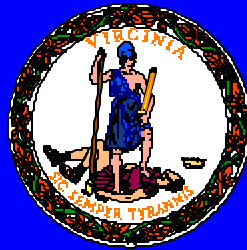


Virginia Department of Health Division of Health Hazards Control



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Virginia Fish Consumption Advisory Program

Coordinated by several agencies



Department of Environmental Quality (DEQ)



Department of Health (VDH)



Department of Game and Inland Fisheries (DGIF)

Virginia Fish Consumption Advisory Program

Role of VDH

Recommendation for sampling

Evaluation of data

Human health risk assessment

Dissemination of information

**(Issuance of fish consumption
advisories or bans)**

Virginia Fish Consumption Advisory Program

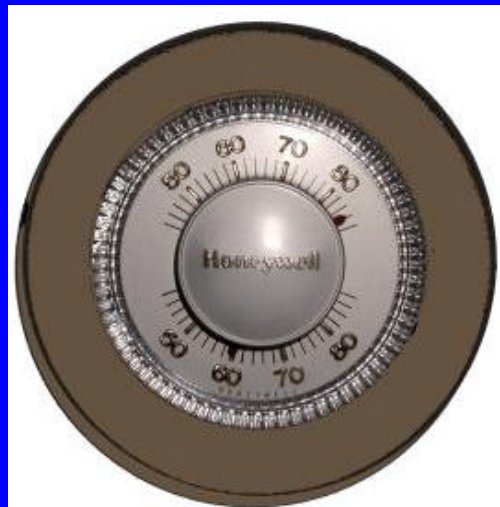
Dissemination of information

- **Press Release**
- **Fact sheets**
- **Posting of signs at public access points**
- **Annual fishing regulations distributed by DGIF with license**
- **Internet Web site**
- **Mailing information on request**

Health Effects of Mercury

Mercury

- Elemental mercury
- Inorganic compounds
- Organic compounds (methylmercury and dimethylmercury)



Elemental Mercury

- **Poorly absorbed by the gastrointestinal tract**
- **Not very toxic when ingested**
- **Vapors are extremely toxic**
- **Inhalation of vapors causes neurological effects and kidney damage**

Inorganic Mercury

Hatter's Disease

200 years ago, beaver fur was dipped in a solution of mercury nitrate as a preservative and to soften animal hair and was used to make hats. It caused shaking and slurred speech





Organic Mercury Compounds

- Organic mercury compounds such as methylmercury and dimethylmercury are very toxic
- Absorbed well through ingestion
- In the environment, elemental mercury is converted to methylmercury
- Typically found in seafood after elemental mercury is discharged in the waterways

Symptoms of Mercury Poisoning

- **Numbness around the mouth and limbs**
- **Sensory disturbance**
- **Difficulty with hand movement**
- **Lack of coordination**
- **Weakness and tremors**
- **Slurred speech**
- **Ataxia**
- **Disturbance of vision and hearing**
- **General paralysis**
- **Deformity of the limbs and difficulty in swallowing**
- **Convulsions and death**

Organic Mercury Poisoning

- Exposed to Dimethylmercury (August 1996)
- Diagnosed with mercury poisoning in January 1997
- Tingling in fingers and toes, slurred speech, blurred vision
- Went into coma 2 weeks later
- Died August 1997



Karen Wetterhahn

Organic Mercury Poisoning

Minamata Disease

- Minamata Bay, Japan, 1950s
- Seafood from the Bay was contaminated
- More than 2,000 people were affected
- More than 50 deaths
- Many spontaneous abortions
- Several deformed babies
- Iraq, 1971, Grain contaminated with methylmercury
- 460 deaths

Mercury Poisoning

Minamata Disease



Mercury Poisoning, Minamata

Deformed Babies

High rate of cerebral palsy



Health Effects of Mercury

- **The major risk of adverse effects of mercury is for fetuses and young children**
- **Most at risk are pregnant women, women who may become pregnant, nursing mothers, and young children**

Reference Dose (RfD)

RfD is an estimate of the amount of a chemical that a person can be exposed to on a daily basis that is not anticipated to cause adverse health effects over a person's lifetime.

Reference Dose (RfD)

- Based on studies in experimental animals which are exposed to a chemical at varying doses
- The dose at which no adverse effects are observed (NOAEL) or the dose at which lowest adverse effects are observed (LOAEL) is then divided by an uncertainty factor

$$\text{RfD} = \frac{\text{NOEL or LOEL}}{\text{Uncertainty Factor (10 - 1,000)}}$$

RfD

- The uncertainty factor considers inadequacies of experimental study
 - Extrapolation of animal-to-human
 - Sensitive population
-
- The reference dose for mercury has been derived at 0.0001 mg/kg/day

Derivation of Acceptable Concentration in Fish

$$C = \frac{RfD \times BW \times T}{MS \times NM}$$

Where:

C = Acceptable concentration

RfD = Reference dose, milligrams per kilogram per day (mg/kg/day)

BW = Body weight (70 kg)

T = Time period (30 days/month)

MS = Meal size, 8-oz or 0.227 kg

NM = Number of allowable meals per month

Derivation of Acceptable Concentration in Fish

$$C = \frac{0.0001 \times 70 \times 30}{0.227 \times 2}$$

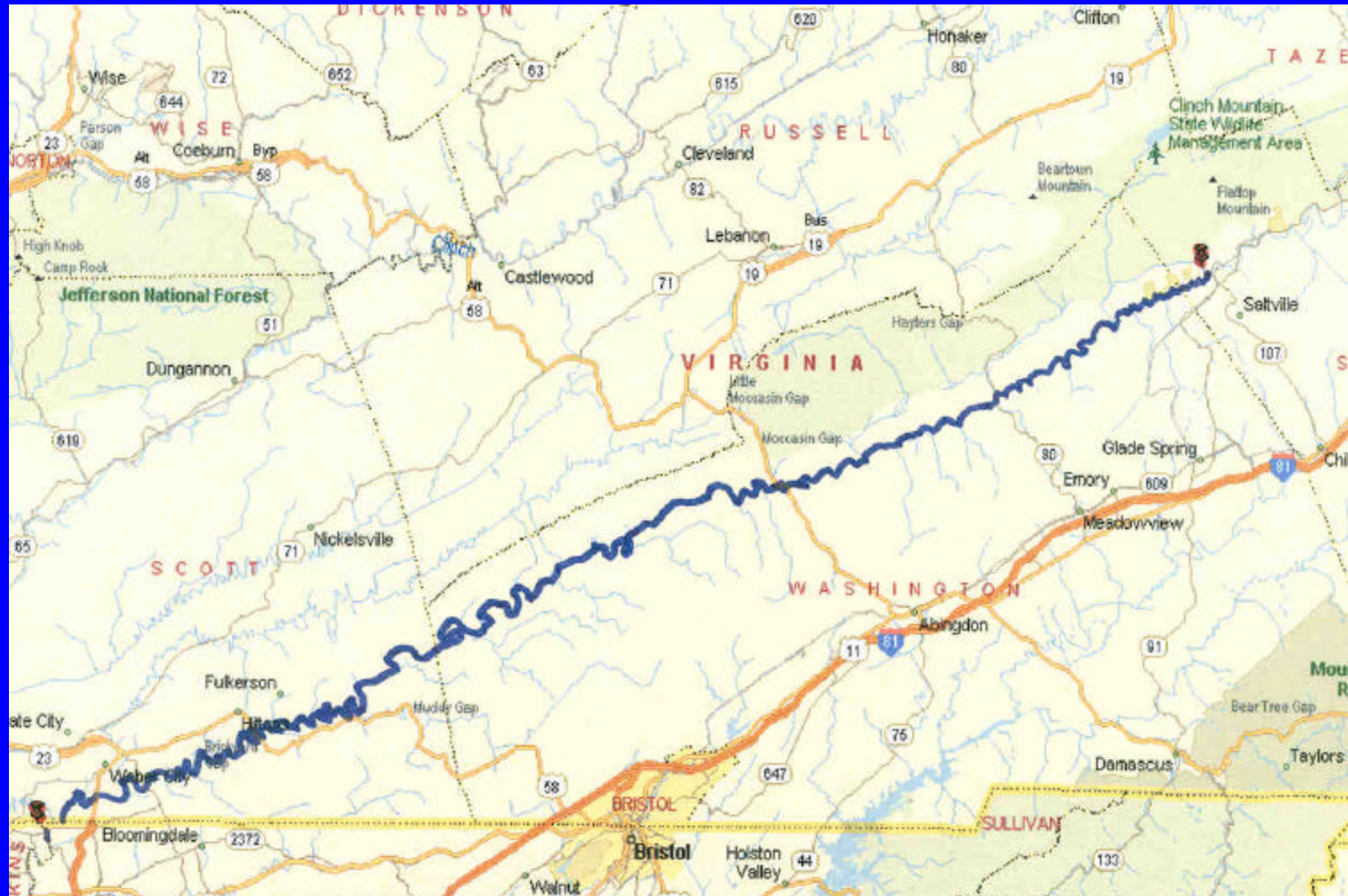
0.4625 ~ 0.5 mg/kg

or 0.5 parts per million (ppm)

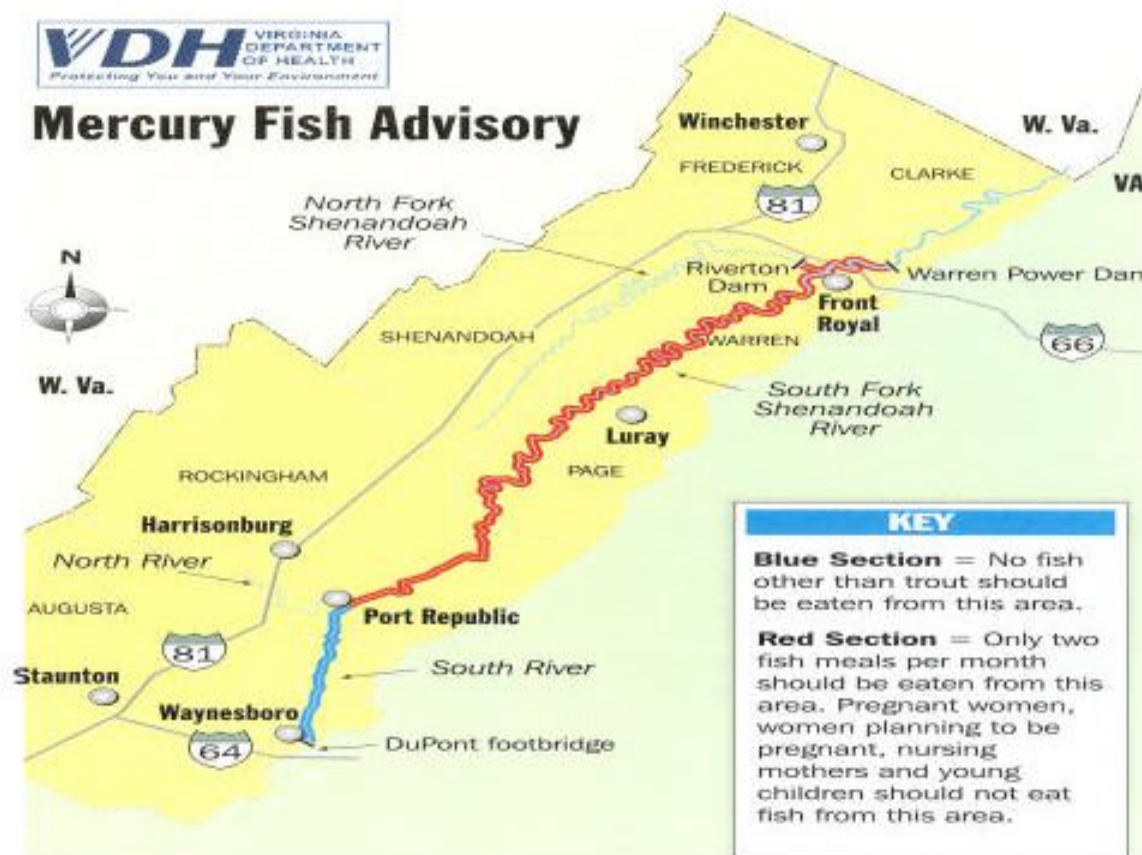
VDH Advisory Levels for Fish Consumption

- **Unlimited Consumption** **Below 0.5 ppm**
- **Two meals/month** **>0.5 to < 1ppm**
- **One meal/month** **>1 to < 2.0 ppm**
- **No consumption** **>2.0 ppm**

VDH Prohibition on Consumption of Fish, North Fork Holston river



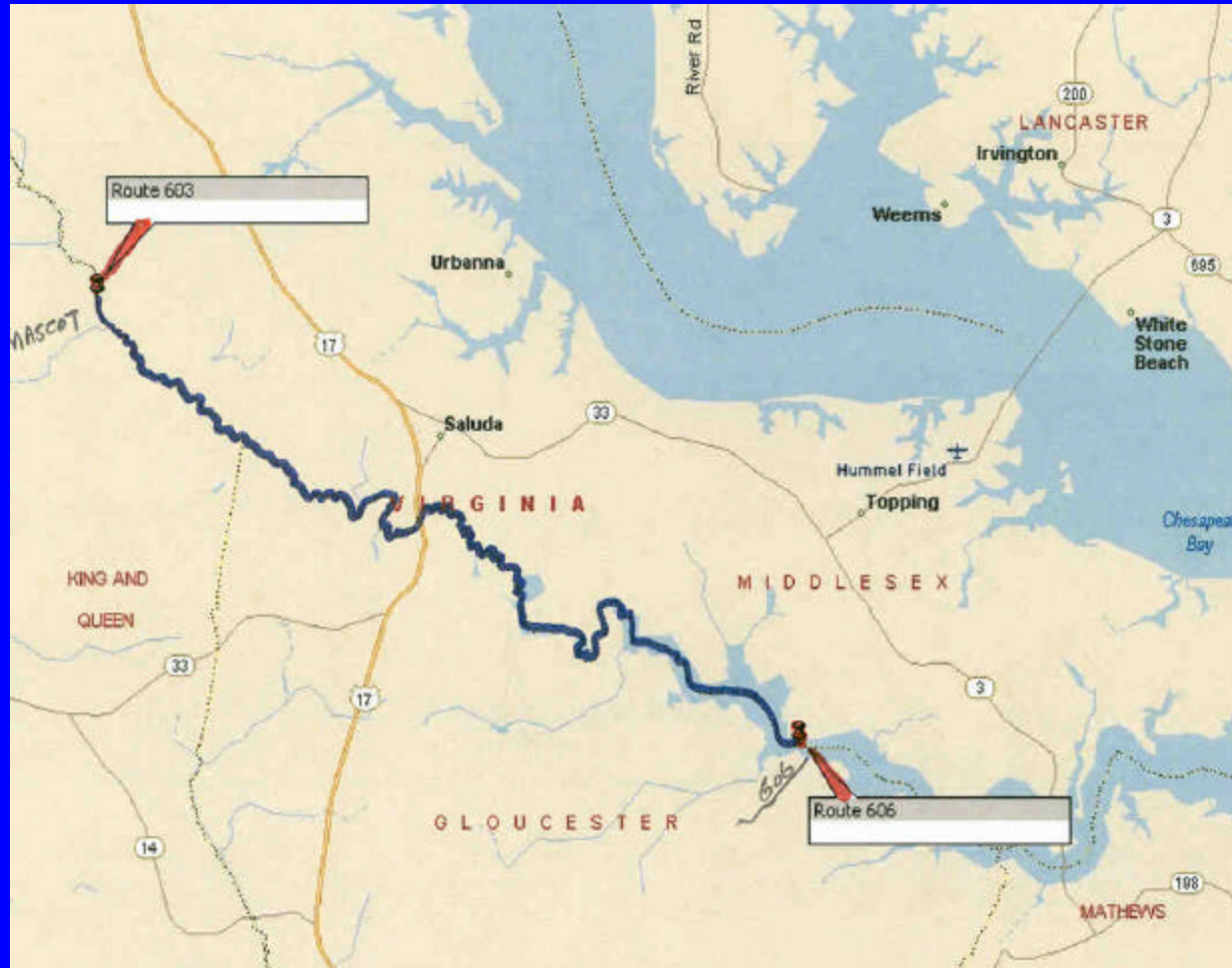
VDH Advisory South River, South Fork Shenandoah, and Shenandoah Rivers



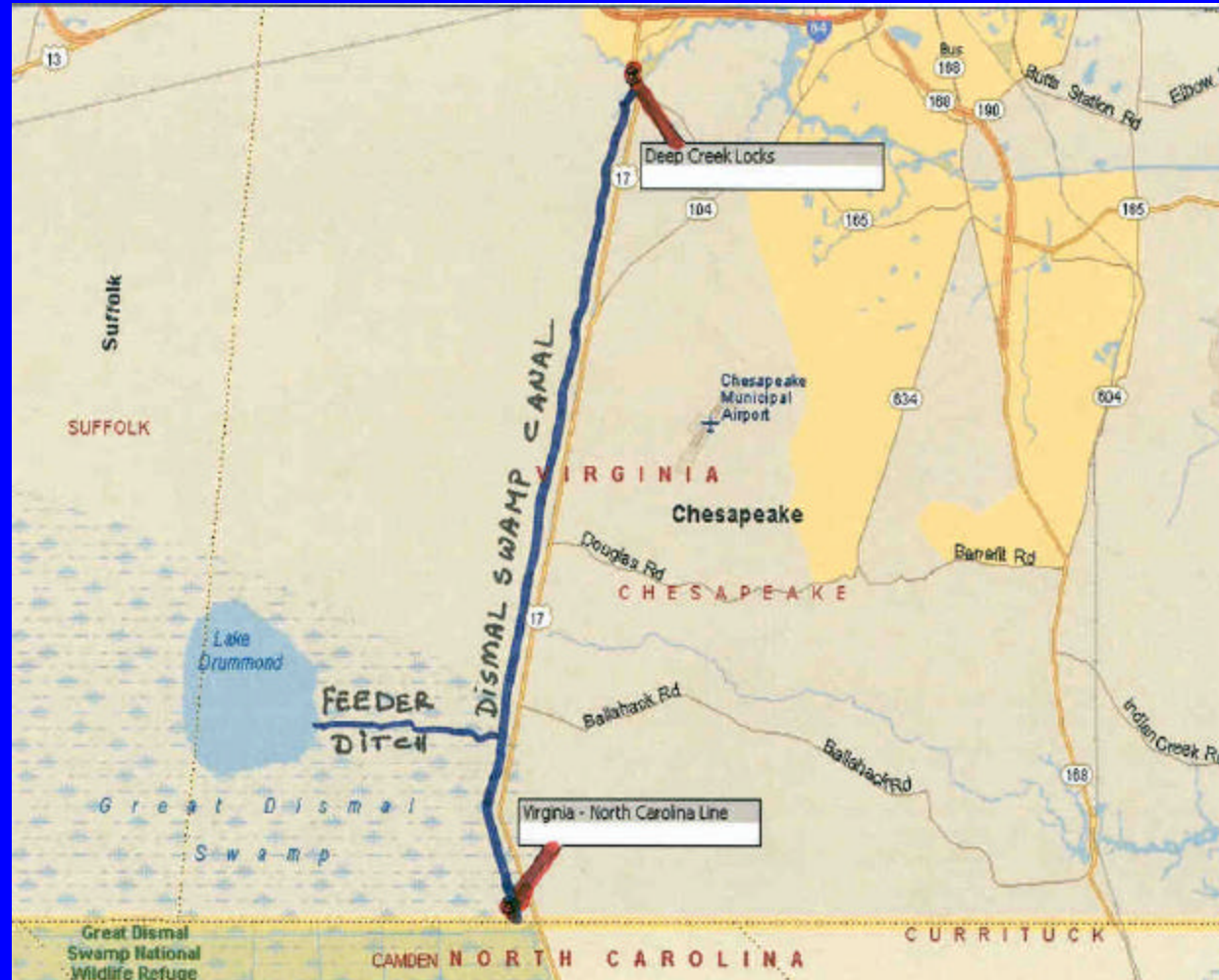
VDH Advisory on Blackwater River



VDH Advisory on Dragon Run



VDH Advisory on Great Dismal Swamp



VDH Fish Consumption Advisories

- North Fork Holston River from Saltville to the Virginia/Tennessee state line
- South River from the footbridge at E. I. Dupont Co. in Waynesboro to the confluence with the North River at Port Republic
- South Fork Shenandoah River from Port Republic to the confluence with North Fork Shenandoah River, North Fork Shenandoah River from mouth of river upstream to Riverton Dam, Shenandoah River from confluence of North Fork and South Fork to Warren Power Dam just north of Front Royal
- Dragon Run Swamp/ Piankatank River (Counties of Middlesex, King and Queen, and Gloucester) from State Route 603 near Mascot downstream (~19 miles) to Deep Point Boat Landing (State Route 606) on the Piankatank River, across from Piankatank Shores
- Blackwater River (Counties of Southampton and Isle of Wight and Cities of Franklin and Suffolk) from State Route 460 in Zuni downstream (~40 miles) to the Virginia-North Carolina state line.
- Great Dismal Swamp Canal (Chesapeake) from Deep Creek Locks south to the Virginia-North Carolina state line including the feeder ditch to Lake Drummond
- Taking fish from these waters for human consumption is prohibited. (12/4/74)
- No fish other than trout should be eaten from these waters. (3/29/01)
- Two meals (1/2 lb each) of fish per month.
- Largemouth bass - No more than two eight-ounce meals per month (10/29/03)
- Largemouth bass and redear sunfish - No more than two eight-ounce meals per month (10/29/03)
- Bowfin and chain pickerel - No more than two eight-ounce meals per month (10/29/03)